The Pocket PC as an Information Management Tool for Academics in Australia: An Exploratory Study

by Geoffrey Chow, Henry Wai-Leong Ho and Peter N. Ling

Abstract

The increasing use of portable computers and mobile computing and telecommunication devices means a re-think of how we access and retrieve information. Like many workers in knowledge-rich professions, university academics in Australia are increasingly overloaded with information in the form of messages, notes, papers, publications, books and so on. They have to handle, process, store, and make decisions on the information received on a daily basis. Conversely, university academics are also expected, at times under pressure, to produce more of this type of information, which in turn, increases the pressure on their peers in academic circles to handle an increasing amount of information. The technological development that fosters the information explosion also produces new means of coping with it. This research investigated the potential of the Pocket PC to assist academics in meeting the increasing informational demands placed upon them.

Introduction

New teaching methods and flexible learning approaches are constantly being researched in education (Graham and Scarborough 1999; McLoughlin 2002). Many educators are now implementing new technology in their courses such as an online syllabus, Internet term projects and online homework assignments (Clarke III, Flaherty et al. 2001). The use of technology in online classrooms can encourage creative teaching and promote learning within smaller classes with students who can work on their own and, require learning flexibility (Abernathy 1999; Benbunan-Fich 1999; Eastman and Owens-Swift 2001).

The increasing use of portable computers, mobile computing and telecommunication devices means a re-think of how we access and retrieve information. We have seen laptop computers used in an education environment for a decade. Palm Pilots are making incursion into schools and other education environments. Pocket PCs, another type of mobile computing device, have been promoted and sold for business and personal usage. In other words, handheld computers including Personal Digital Assistants (PDAs) and Pocket PC (PPC) are gradually penetrating our workplace. We believe Pocket PCs may also have a potential use in an academic environment. This research investigates the potential of the Pocket PC to assist academics in meeting the increasing informational.

Background

The project reported here was undertaken at Swinburne University, a small multi-campus technology university based in Melbourne, Australia. The genesis of the research project was the realisation by an academic staff member of the possibility that the PPC could be of benefit to many

academics. In the two years prior to this project, Swinburne University had piloted a study of the use by students and academics of on-campus wireless network technology (Constantine, Arger, & Ling, 2003). Swinburne University had placed an emphasis on the deployment of information technology for learning, teaching, research and other services, which contributed to the desire to gain a better understanding of the potential use of the PPC by academics.

On-campus wireless network

Networking is rapidly moving towards wireless communication. Indeed, all of technological society is moving to an "on-demand" and location-independent mode of information access, with high throughput (Bothun 2003). In brief, wireless network can be explained as: "A network set up by using radio signal frequency to communicate among computers and other network devices. Sometimes it's also referred to as Wi-Fi network or WLAN (Wireless Local Area Network)" (Home-Network-Help.Com).

For universities in Australia, wireless networking is becoming a popular substitute for wired networks, especially in dynamic environments. In brief, on-campus wireless access means that any staff member or student who owns a laptop, PPC or PDA that can receive a wireless signal will be able to get his/her e-mail, access the an online learning management system, and surf the internet without using any wires or physical connections in the library or computer lab. In other words, on-campus wireless access is an emerging service for students and staff at universities across Australia. Wireless access is usually associated with "hotspots" (those designated areas where wireless access is available). With improvements in wireless technology, and favourable campus geography, complete wireless coverage of campuses is possible.

Most university wireless hotspots are located in designated areas, particularly libraries, student cafes and bars, but Swinburne University was one of the first to provide total coverage on campus (Nelson 2003). Swinburne University's Wireless is capable of a 54 Mbps (megabits per second) data transmission rate, and has wireless coverage at all of its five major campuses, Hawthorn, Prahran, Lilydale, Croydon and Wantirna. In Hawthorn itself, there are 300 Wi-Fi base stations.

Pocket PC (PPC)

Despite the flat sales of personal computers (PCs) in the past few years, a growing sector in the computer industry has been handheld computing devices such as PPC or PDA. These devices have evolved from simple address book and calculator-like units to powerful hybrid computers with colour displays, handwriting recognition, multimedia support, and wireless network capabilities. Newer hybrid devices merge technologies from telephony (so-called smart phones), paging, and networking into a single unit that supports Internet browsing, e-mail, audio, and multimedia.

PPC share several features that make them well suited for the mobile professional. Being small and lightweight, they are easy to handle and more likely to be carried around than a laptop computer. They turn on and off instantly, making it convenient to access the information they contain whenever it is needed (Embi 2001). In addition, information can be transferred back and forth between handhelds and PCs, a process called synchronization or "hot syncing." Although handhelds can certainly be used

independently, their real power is unleashed when they are used with PCs. Through synchronization, handheld data can be backed up and managed on the PC, and third-party applications can be installed from the PC to the handheld (Embi 2001).
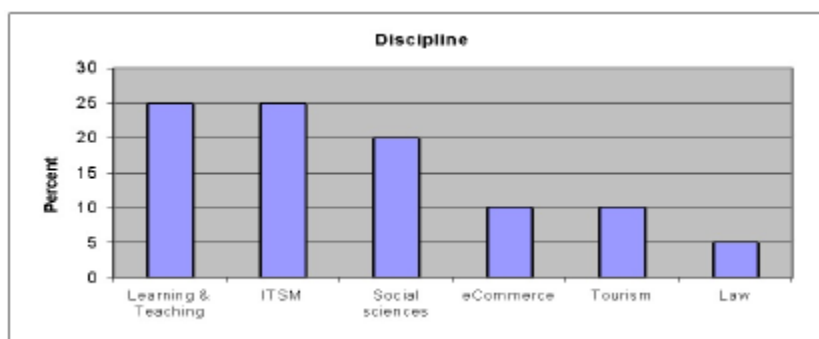
PPC used for this study

The PPC (Model: iPAQ Pocket PC hx2750) used in this research study is shown in Appendix A of this paper. At the time of this study, the hx2750 was the top-of-line model in the range of mobile computing devices manufactured and marketing by Hewlett Packard (HP). The major technical features of the device are listed below:

- 624 Mhz Intel Xscale processor
- Integrated Wireless LAN (802.11b), Bluetooth Wireless (v1.1) and infra-red wireless technologies
- Biometric fingerprint reader for security
- 3.5 inch transflective TFT display (240 x 320 resolution) with more than 64,000 colours
- 128Mb RAM + 128Mb ROM - largest memory for palm-size devices
- Integrated Secure Digital slot - for additional safe storage. Also a Compact Flash slot is included
- HP iPAQ expansion pack system; many additional accessories available e.g. GPS, camera and etc.

Research Methodology

Academics were invited to participate and twenty of them took up the invitation, 7 males and 13 females. Eleven of the participants were between ages 30 and 49, with the remaining 9 participants aged 50 or above. Most participants were located at Lilydale Campus, with 5 located at Hawthorn Campus. The participants were from a range of teaching areas. Figure 1 below shows that five participants were from the Learning and Teaching Support (LTS) area. LTS is responsible for educational development at Swinburne University and works with academics to improve learning and teaching performance, including improved use of educational technologies. Five participants were from Information Technology Systems Management ITSM, four from Social Sciences and the remainder from e-Commerce, Tourism and Law discipline areas.

Chart 1: Academic Participants by Discipline Area

None of the academic participants had used a hand held device prior to the project, and the majority (75%) had not previously made use of the University's wireless network.

Two sets of self-completion web-based surveys were administered to participants involved in this study. The first set of questionnaire surveys related to setting up a baseline to allow observation of the difference in academics' responses to the demands of academic life. An *initial* survey (administered in the first week of the study) investigated the expectations of academics about the elements of functioning as an academic that they would transfer to a PPC or supplement with use of a PPC. As none of the participants had previously used a PPC, usage of any of the functions for academic purposes would constitute a change in baseline behaviour. The survey solicited comments for each of the functions available on the PPC.

The second set of questionnaire surveys involved a *final* survey administered in the eighth week of the study. The survey sought further comments on the participants' use of and location of use of the PPCs by function over the full period of the study.

Each of the surveys was conducted online using *Surveyor* browser-based software. This provided electronic data. Because of the small scale of the study, the data are reported descriptively rather than through regression analysis. The participants in this study were assured that the researchers would adhere to ethical requirements such as maintaining confidentiality of data, preserving the anonymity of informants, and using the research for intended purposes (Mauthner, Birch, Jessop & Miller, 2002).

Research findings

Initial survey

Given that none of the participants had used PPC devices prior to the project, the researchers wished to explore the participants' expectations of the devices and the possible uses to which the devices might be put as an indication of academics' perceptions of the potential of the PPCs. Participants were asked: *"What tasks do you expect to perform with the Pocket PC computer in this project?"* and provided with a structured list of possible applications (see table 1).

Table 1: Expectations of participants in Personal Information Management

Item	N	Yes (n=)*	Yes (%)
Store and retrieve contact details (name, address, phones, email address etc)	20	20	100
Appointments and scheduling	20	20	100
Other time management tasks	20	11	55

As shown in table 1, all the participants (100%) claimed that they planned to use the PPC for storing information such as contacts and helping in arranging of appointments. The other time management tasks which the participants anticipated they would be able to undertake with the device were primarily "to do lists", note taking, working "on the fly", and "document management" type of tasks.

The second major area of functionality suggested to the participants was "Communication and the Internet".

Table 2: Expectations of participants in the use of Communication and the Internet

Item	N	Yes (n=)	Yes (%)
Send / retrieve email	20	20	100
Access the Swinburne website	20	20	100
Access other websites (work related)	20	17	85
Access other websites (not related to work)	20	12	60
Read online news	20	10	50
VOIP (voice over Internet) telephony	20	9	45
Instant messaging (Skype, MSN, Yahoo etc)	20	6	30
Other	20	2	10

As shown in table 2, participants clearly anticipated that basic web access and email functionality would be available via the PPC device. A sizeable minority (45% and 30% respectively) anticipated that they would be able to access more advanced services such as VOIP telephony and instant messaging. The few additional comments indicated the participants hoped to use the PPC for "research" or "directories".

The third area for which feedback regarding the participants' expectations was sought was "Files access/ transfer and information access".

Table 3: Expectations of participants in the use of Files access/ Transfer and Information Access

Item	N	Yes (n=)	Yes (%)
Access BlackBoard / WebCT	20	20	100
Transfer files between Pocket PC and desktop PC or Intranet	20	20	100
Search, store, and access full-text resources provided by the Swinburne library	20	12	60
Access files on the Swinburne Intranet (e.g. Drive F, G etc)	20	12	60
Use Swinburne library catalogues and other library catalogues	20	2	10
Other	20	0	0

Table 3 shows that all participants expected they would access the University's Learning Management Systems (LMS) environments and be able to transfer files. The majority (about 60%) anticipated that they would be accessing the online full text resources provided by the Swinburne Library, and the files stored on the Swinburne Intranet. Only 2 anticipated accessing library catalogues, and there were no other suggestions made for further applications or functions.

The final cluster of anticipated usage was "Other tasks and functions".

Table 4: Expectations of participants in the use of Other Tasks and Functions

Item	N	Yes (n=)	Yes (%)
Picture / photo viewing	20	15	75
Play music	20	14	70
Presentation (PowerPoint slides)	20	13	65
Spreadsheet (Pocket Excel)	20	12	60
Dictionary (English, foreign-language)	20	10	50
Video viewing	20	6	30
Printing of files	20	5	25
Language learning (Italian, Chinese etc)	20	2	10
Word processing (using Pocket Word or an editing software)	20	1	5
Other	20	1	5

As shown in table 4, there was less commonality in the academic staff's expectations on these applications and functions. Picture viewing (75%) and Music playing (70%) were anticipated uses by most. At least half the participants also anticipated use of PowerPoint, spreadsheets or Dictionaries. Other applications were anticipated by smaller numbers of participants. In the comments, participants identified "audio note taking" and "listening to radio programs" (podcasting) as potential activities.
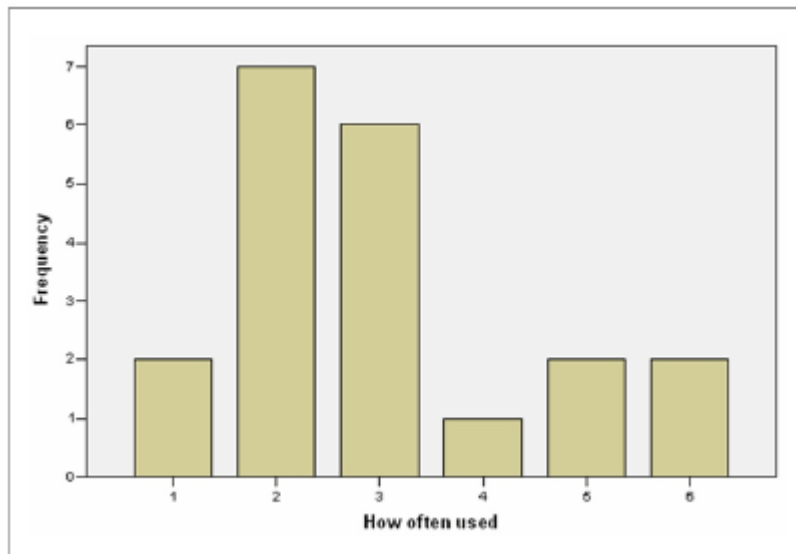
Final survey

Participants were asked to complete a final survey at the completion of the project. Of the 20 participants 19 completed the final survey. We have reported the findings of final survey into sub-categories for easy viewing.

Frequency of use

First, participants were asked to estimate, on average, how often they used their PPC (Rating scale: 1 = many times per day, 2 = several times per day, 3 = usually at least once each day, 4 = several times a week, 5 = maybe once a week, 6 = hardly at all).

Chart 2 - Estimate of frequency of use

As shown in chart 2, forty-five percent estimated that they had used their device "many times per day or "several times per day". Only four participants reported once a week or less use. Respondents' estimate of use was lower than their reported use in the weekly surveys.

Personal Information management

Participants were asked to rate the usefulness of the Pocket PC for clusters of functions on five-point Likert scale (1 = Highly useful and 5 = Not at all useful). These functions matched the functions for which the participants had been asked about their anticipated use at the commencement of the project (initial survey). As shown in table 5, most of the participants have changed their perception towards PPC (in comparing the initial and final survey) after they had some hands-on experience with it. Although respondents noted that the PPC was particularly helpful in storing and retrieving data (mean: 2.58), and in arranging appointments and scheduling (mean: 2.11), they indicated that they hardly used their PPC for any other time management task (mean: 3.26).

Table 5: Rating of usefulness - Personal Information management

Item	Initial Survey	*Final Survey	
	Anticipated use (%)	Mean	St. D
Store and retrieve contact details (name, address, phones, email address etc)	100	2.58	2.49
Appointments and scheduling	100	2.11	3.11
Other time management tasks	55	3.26	1.10

(*Five-point Likert scale: 1 = Highly useful and 5 = Not at all useful)

Two participants also provided some useful feedback in qualitative format.

One participant found that the "task option was extremely useful" while another noted "This is about all I can use the computer for!"

Communications and Internet

Participants were asked to rate the usefulness of a range of applications and functions utilizing the communications capacities of the PPC, on the same 1-5 scale. Once again, the applications listed in the final survey mirrored the anticipated use questions in the initial survey.

Table 6: Rating of usefulness - Communications and Internet

Item	Initial Survey	*Final Survey	
	Anticipated use (%)	Mean	St. D
Send / retrieve email	100	4.32	4.09
Instant messaging (Skype, MSN, Yahoo etc)	30	4.16	4.28
VOIP (voice over Internet) telephony	45	4.00	5.41
Access the Swinburne website	100	3.79	2.86
Access other websites (work related)	85	3.95	3.78
Access other websites (not related to work)	60	4.42	5.36
Other	10	2.42	3.39

(*Five-point Likert scale: 1 = Highly useful and 5 = Not at all useful)

As shown in table 6, the participants' anticipations in this area were largely disappointed. Despite the highly-anticipated use of these functions, the overwhelming majority of participants rated each of these functions in the low usefulness categories (mean $\geq$ 2.42 for all the items in table 6). One participant observed:

"Email, messaging and VOIP have not been useful as I have not managed to get them to work. Accessing the Internet would be useful but again has not worked well. The first 2-3 weeks I had great success but afterward I started to have problems on a daily basis."

At the same time, most participants identified technical issues – "trouble getting online" in comments relating to these applications. As the participant above is suggesting, whatever the potential of the PPC, without the necessary connectivity and support many of the potential functions are rendered useless. Participants clearly burned out in their fruitless efforts to resolve these issues. One of the participants claimed that: "My PPC will not synchronise with my computer despite several visits from the Helpdesk. I am sick of asking them to fix it"

A couple of participants also commented upon issues relating to the device itself – "screen size" and "difficulty typing" - as well as the connectivity problems as barriers to the use of these functions.

File access/transfer and information access

The next question looked at how useful the PPC was for participants in managing file access/transfer and information access on the same 1-5 scale. Once again, the applications in the final survey mirrored the anticipated use questions in the initial survey. As shown in table 7, the expectations of the participant group were not borne out in practice. The

overwhelming majority expected to use the device for these applications, and the overwhelming majority rated them as of low usefulness in practice (mean $\geq$ 3.21 for most of the items in table 7). However, access to the library catalogue received a slightly better rating from the participants (mean = 2.95).

Table 7: Rating of usefulness - File access/transfer and information access

Item	Initial Survey	*Final Survey	
	Anticipated use (%)	Mean	St. D
Access BlackBoard / WebCT	100	3.68	3.13
Transfer files between Pocket PC and desktop PC or Intranet	100	4.05	4.93
Search, store, and access full-text resources provided by the Swinburne library	60	3.95	4.72
Access files on the Swinburne Intranet (e.g. Drive F, G etc)	60	3.89	3.78
Use Swinburne library catalogues and other library catalogues	10	2.95	2.41
Other	0	3.21	4.72

(*Five-point Likert scale: 1 = Highly useful and 5 = Not at all useful)

A characteristic comment received was

"This area was limited to the software not performing consistently - I lost faith and confidence in it ...

Once again issues with support seem to have demoralised and frustrated participants:

"When I asked for help regarding Wireless connection they told me it was not available despite seeing others with the wireless link working"

Other tasks and functions

The final cluster of usage for which a usefulness rating was sought was "Other tasks and functions" on five-point Likert scale (1 = Highly useful and 5 = Not at all useful). Again, the applications in the final survey mirrored the anticipated use questions in the initial survey.

Table 8: Rating of usefulness - "Other tasks and functions"

Item	Initial Survey	*Final Survey	
	Anticipated use (%)	Mean	St. D
Picture / photo viewing	75	3.58	2.77
Play music	70	4.00	4.10
Presentation (PowerPoint slides)	65	4.16	4.83
Spreadsheet (Pocket Excel)	60	4.32	5.86

Dictionary (English, foreign-language)	50	3.47	3.11
Video viewing	30	3.95	4.222
Printing of files	25	3.95	5.50
Language learning (Italian, Chinese etc)	10	4.16	5.98
Word processing (using Pocket Word or an editing software)	5	3.84	4.51
Other	5	2.37	3.39

(*Five-point Likert scale: 1 = Highly useful and 5 = Not at all useful)

As shown in table 8, participants' expectations of these applications and functions were relatively more varied in the initial survey than for other categories. Ratings of usefulness are once again overwhelmingly at the low end of usefulness (mean $\geqslant$ 3.84 for most of the items in table 8), though a scattering of participants rated individual applications at the slightly higher end of the usefulness scale (mean = 3.58 for photo viewing and mean = 3.47 for dictionary application). Some participants clearly had difficulty using the applications in the Pocket PC environment:

"Spreadsheet software was difficult to use, again the interface screen size made spreadsheeting difficult. Word processing was slow and not very productive, better in a read only mode after having transferred a file."

Location of use

Apart from questions in the five-point scale as shown above, participants were asked:

Where did you use the Pocket PC most often? (Please mark 1 for most frequent, 2 for next frequent, etc, with no entry of locations not used)

Table 9: Location of use (n=19)

Item	1 (Most Frequent)	2	3	4	5	6	7 (Least Frequent)
In Office	10	3	1	1	0	3	1
At home	3	8	3	1	1	2	0
Whilst traveling	1	0	6	5	0	0	2
In library	1	0	0	1	5	1	5
Other on-campus locations	2	1	3	3	2	1	3
Wireless "hotspots"	1	2	0	2	2	2	5
Other	1	0	0	0	0	6	7

Table 9 indicates that the most frequent single location was "In office" (which might be odd for a device whose main characteristic is its portability?). The second most frequent location of use was "at home", third "On campus" locations, and fourth "Whilst traveling. It is possible that some participants understood "wireless hotspot" to refer to a location on campus.

It is worth noting the diversity of locations in which participants recorded use of the PPC.

Self-evaluation of proficiency

Apart from that, participants were asked to evaluate their own proficiency with the PPC on a five-point scale (1 = Not at all proficient to 5 = Highly proficient).
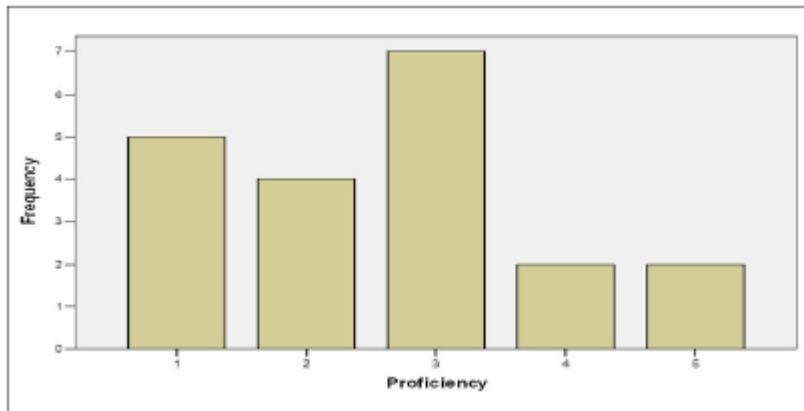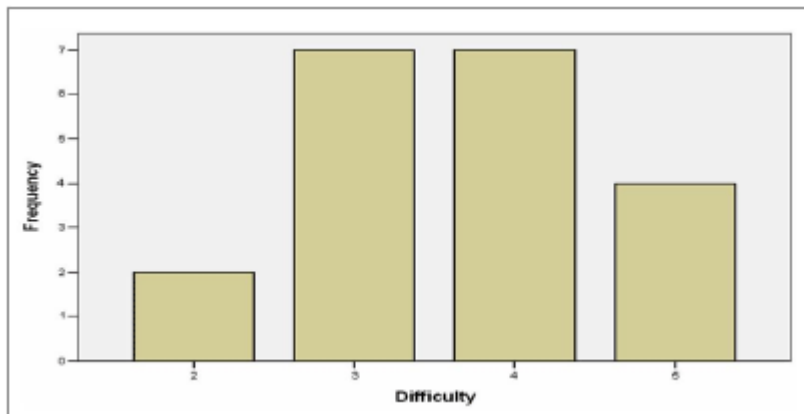
Chart 3: Self-evaluation of proficiency

Chart 3 suggests that the participants generally felt that they still had some distance to go in acquiring proficiency with the device and its applications, with only 4 participants ranking themselves at the higher end of the proficiency scale, while 9 participants gave themselves low proficiency ratings.

Difficulty in acquiring proficiency

Participants were also asked: "How difficult do you think it is to become proficient with the pocket pc for the tasks which you found most valuable?" Participants were asked to rate difficulty on a five-point scale, where 1=difficult and 5= easy.

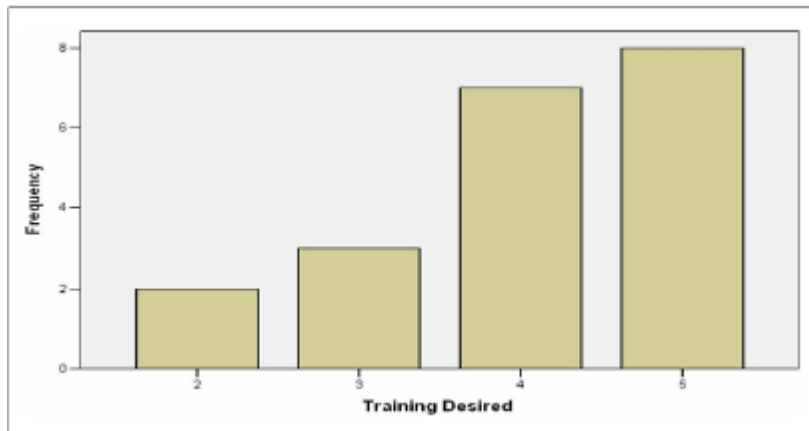Chart 4: Difficulty in acquiring proficiency

Curiously, given the participants' generally poor self rating of their own proficiency, the consensus seemed to be that acquiring proficiency was more towards the "easy" end of the spectrum (see chart 4). This could reflect the fact that the participants were in the main only able to use the

more straightforward applications like task lists and note taking. This is supported by the responses to the next question,

Level of training participants wished to receive

Next, participants were asked: "What level of training would you have liked to receive?" As for this question, responses were back on a five point scale, 1 = No training required and 5 = A lot more training.

Chart 5: Level of training you would have liked to receive

As shown above (chart 5), none of the participants felt that no training was required, and most of the participants indicated that they would have liked more training. In comments, most participants again raised support issues and technology problems:

"I have found the PPC quite easy to use however managing the technical problems and troubleshooting has been very frustrating. The help on PPC, on HP website and active synch has not been particularly helpful."

The frequency with which these comments were made indicates the level of difficulties that the participants must have experienced during the project. Some participants also indicated that more follow up or one-on-one sessions on specific functions – such as accessing wireless hotspots – could have been valuable.

The important of participants developed their skills in using the PPC

To better understand the ways in which the participants developed their skills in using the PPC, they were asked: "In learning how to use your pocket pc, how important were the following?" Once again, participants were asked to rate the usefulness of a range of learning strategies on a five point scale (1 = Not at all useful, 5 = Highly useful).

Table 10: Uefulness of strategies in developing participants' skills in using the PPC (n=19)

Item	Not at all useful	May be a bit useful	Medium	Next most useful	Highly useful	*Weighted Total
Reading the manual	2	3	8	4	1	51

Trial and error	1	1	1	7	9	78
Colleagues	0	2	4	10	3	71
Family or friends	9	2	3	2	2	31
Training sessions	1	2	5	5	4	59
Printed training resources	1	3	6	4	3	55
Documentation loaded on the pocket PC	6	4	4	3	1	37
Online FAQ's	12	3	1	1	0	13
Other	8	0	0	0	2	10

(Five-point Likert scale: 1 = Highly useful and 5 = Not at all useful)
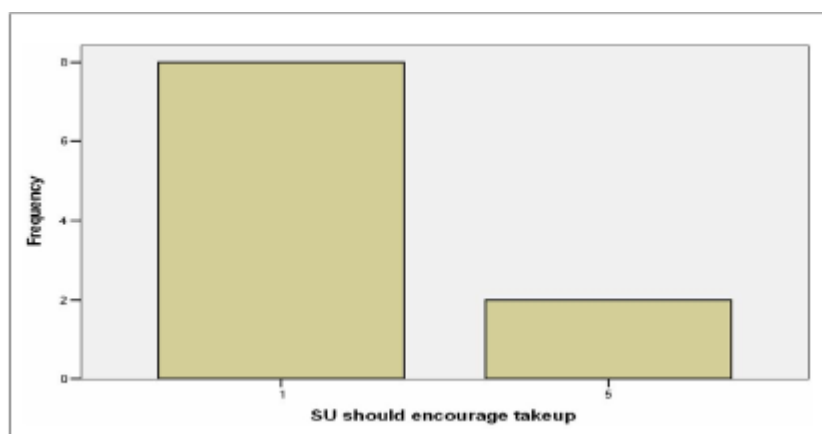
Responses were weighted using the following formula:
(Weighted total = Highly useful*5+Next most useful*4+Medium*3+Maybe a bituseful*2)

Trial and error and colleagues were the most commonly resorted to learning strategies, followed by the training sessions and printed training resources. A number of staff commented that they did not know of the online FAQ. Several also identified a particular member of ITS staff as "Highly useful" (see table 10).

Swinburne University should encourage take-up

The final question for the participants was "Do you think Swinburne University should develop mechanisms to encourage take up of Pocket PCs by staff?"

Chart 6 Swinburne should encourage take-up

Given the problems that the participants seem to have encountered, the device received surprisingly strong endorsement. Fourteen (or over

77.8%) of the academic staff responded "yes" to this question (see chart 6). However, the comments indicated that for many participants there were some strong caveats – regarding software and institution willingness to support take-up.

Conclusion

Most respondents indicated at least daily frequency of use. In the current IT mediated learning environment, where teaching staff may spend the majority of any day using a desktop or laptop pc, the relative significance of this reported use is hard to gauge. Participants used a wide range of applications, with the personal information management tools being used the most and most highly ranked in terms of usefulness. Participants' expectations of use were quite different from their experience. From the comments, the gap between expectation and actual use was closely related to both the inherent limitations of the device and to issues around connectivity, support and training.

Many participants rated their own proficiency with the device at a low level at the conclusion of the project, so the question of the learning processes involved requires further work. In so far as participants did acquire proficiency, they did so from a combination of methods, with trial and error and colleagues being rated the most useful by participants. Most of the participants indicated that they would have liked more formal training sessions.

The main value of the data retrieved through this project is in the very clear picture that it gives of the pre-requisites for the implementation of the Pocket PC.

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